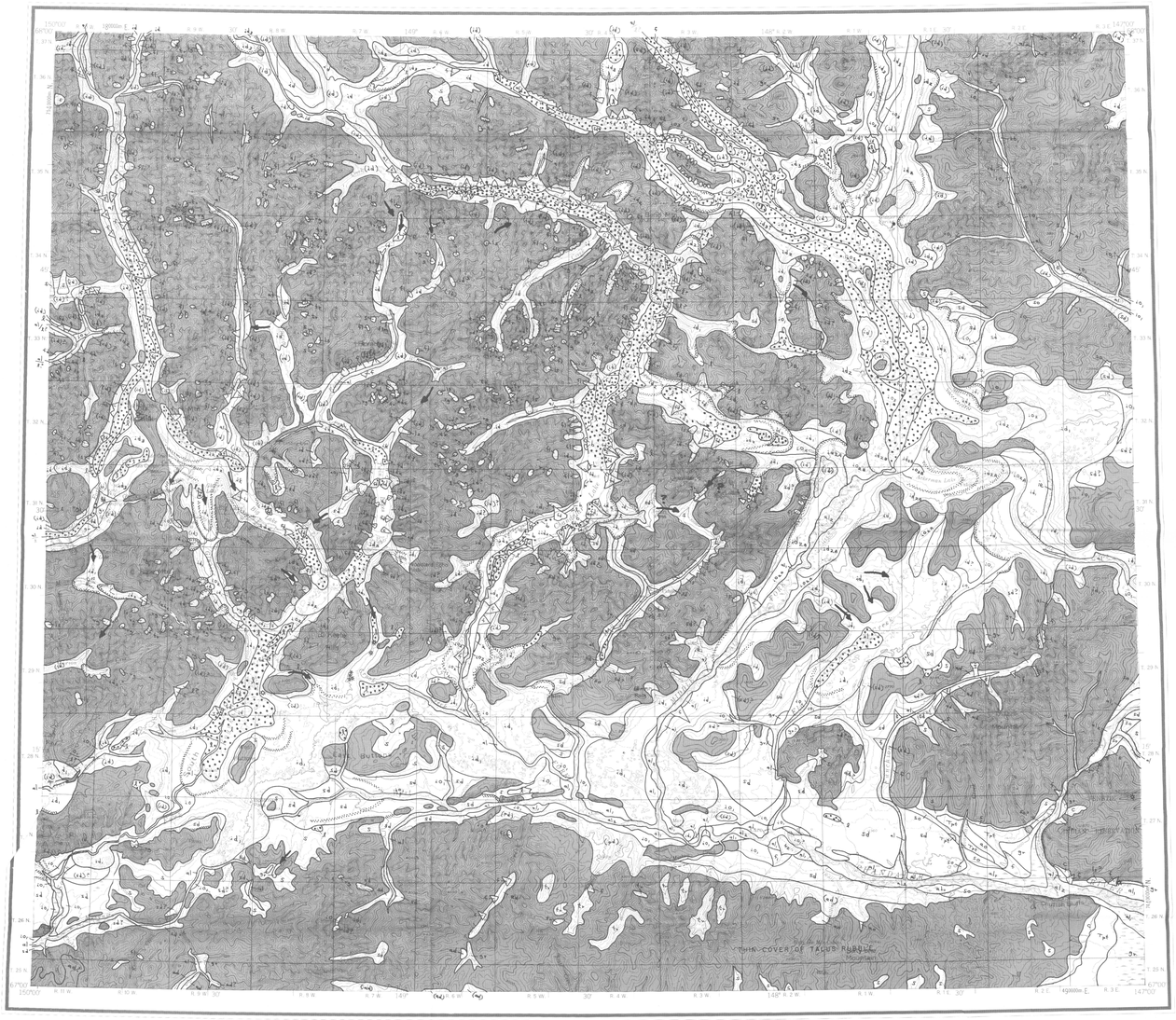
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



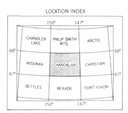
BASE FROM U.S. GEOLOGICAL SURVEY, 1956

SCALE 1:250 000

5 0 5 10 15 20 25 MILES

5 0 5 10 15 20 25 KILOMETERS

CONTOUR INTERVAL 200 FEET
DATUM IS MEAN SEA LEVEL



SURFICIAL GEOLOGIC MAP OF THE CHANDALAR QUADRANGLE, ALASKA

BY

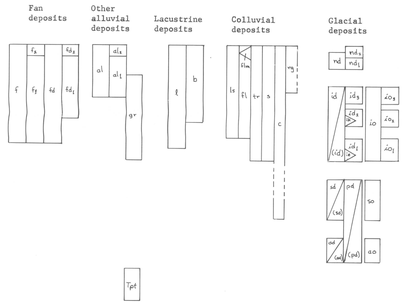
THOMAS D. HAMILTON

1978

GEOLOGY BY J.R. WILLIAMS, 1954; REUBEN KACHADOORIAN, 1969–1970; WARREN YEEND, 1970; R.D. REGER AND RAY KREIG, 1971–1974; AND T.D. HAMILTON, 1968–76;

FOLIO OF THE CHANDALAR QUADRANGLE, ALASKA
MISCELLANEOUS FIELD STUDIES MAP MF-878A
HAMILTON-SURFICIAL GEOLOGY

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

FAN DEPOSITS

f FAN DEPOSITS, UNDIFFERENTIATED--Range from coarse, poorly sorted, weakly stratified, angular to subangular silty rubble near heads of mountain valleys to well-stratified sandy fine gravel at mouths of large streams near south flank of Brooks Range. Fans within mountain valleys subject to icings during winter (see Sloan and others, 1976), slushflows during spring snowmelt period (see Washburn, 1973, p. 164–169), and mudflows during summer

f_2 ACTIVE FAN DEPOSIT--Moderately well stratified, subangular to subrounded, silty to sandy gravel, usually unvegetated. Commonly subject to icings. Differentiated only on very large fan opposite mouth of Flat Creek in Chandalar Valley

f_1 INACTIVE FAN DEPOSIT--Silty to sandy gravel, as described above, generally with thin (less than 0.5 m) cap of silt, sand, or peat; partly to entirely vegetated. Differentiated only on very large fan opposite mouth of Flat Creek in Chandalar Valley, where it is graded to upper surface of low alluvial deposits (unit $a1_1$)

fd FAN-DELTA DEPOSITS, UNDIFFERENTIATED--Range from poorly sorted, weakly stratified, subangular gravel near valley walls to well sorted, well-stratified silt, sand, and fine gravel near valley centers. Represent alluvial-fan deposits grading into lacustrine sediments in moraine-dammed lake basins. Locally subject to icings

fd_2 ACTIVE FAN-DELTA DEPOSITS--Gravel, silts, and sand, as described above; generally unvegetated. Locally subject to icings. Differentiated only on three very large fan-deltas near Chandalar Lake

fd_1 INACTIVE FAN-DELTA DEPOSITS--Gravel, silt, and sand, as described above; generally covered by vegetated cap of organic silt, sand, peat, and sod less than 0.5 m thick. Differentiated only on three large fan-deltas near Chandalar Lake

OTHER ALLUVIAL DEPOSITS

a1 ALLUVIUM, UNDIFFERENTIATED--Ranges from poorly sorted, moderately well stratified, subangular coarse gravel near heads of mountain valleys to well-sorted, well-stratified, sandy fine gravel and gravelly sand along slow-flowing stretches of major streams. Includes fan, flood-plain, and low terrace deposits too small to be designated separately

$a1_2$ MODERN ALLUVIUM--Sand and gravel, as described above; generally unvegetated and commonly subject to icings (see Sloan and others, 1976). Differentiated only along Chandalar River and its East and Middle Forks

$a1_1$ LOW ALLUVIAL TERRACE DEPOSITS--Sand and gravel, as described above; generally mantled with up to 0.5 m of organic silt, sand, peat, and sod; and generally vegetated

gr GRAVEL DEPOSITS, UNDIFFERENTIATED--Gravel and sandy gravel of variable composition forming glacial or nonglacial alluvial terraces of uncertain or composite origin

Tpt PREGLACIAL TERRACE GRAVEL--Rounded to subrounded pebbles and some small cobbles, predominantly of quartz, chert, and quartzite, in brown sandy matrix. Forms terrace remnants 90–100 m above modern valley floors in Chandalar Valley near mouth of East Fork. Clasts are better rounded, better sorted, smaller, and more quartzose in lithology than in any known outwash and postglacial deposits of the Chandalar region

LACUSTRINE DEPOSITS

l LACUSTRINE DEPOSITS, UNDIFFERENTIATED--Well-stratified clay, silt, and sand, grading into generally well stratified sandy fine gravel near former shorelines, especially near former stream mouths. Extensive thick deposits occur behind Itkillik-age moraines along floors of all major forks of Kuyukuk and Chandalar Valleys. Partly buried beneath late-Itkillik outwash and Holocene alluvium, solifluction deposits, and fan deposits (see stippled map pattern). Include beach deposits too small to designate separately

b BEACH DEPOSITS--Nonstratified to well-stratified sand and very well sorted fine (pea) gravel. Differentiated only along shores of Chandalar Lake and its former northward extension

COLLUVIAL DEPOSITS

ls LANDSLIDE DEPOSITS--Unsorted nonstratified coarse angular rubble, commonly with matrix of finer debris, forming lobes associated with detachment scars and slide tracks on high, steep rock walls. Most common on quartz-mica schist as mapped by Brosgé and Reiser (1964). Subject to episodes of rapid downslope motion and long periods of relative stability

fl FLOW-SLIDE DEPOSITS--Unsorted, nonstratified angular to subangular rubble in fine-grained matrix forming lobes subject to slow and probably continuous downslope motion. Common on all varieties of schist within Chandalar quadrangle (see Brosgé and Reiser, 1964); also present locally on slate, limestone, and hornfels. Probably include some inactive rock glaciers

Subunit *flm* designates large, recent (1976) sandy mudflow deposit on tributary of Robert Creek

tr TALUS RUBBLE--Angular unsorted nonstratified rock debris forming cones and aprons more than 2 m thick along lower walls of mountain valleys and in cirques at valley heads. Also forms thin (less than 1–2 m) and generally discontinuous sheets over many areas mapped as "bedrock". Extensive thin blankets of stabilized talus overlie granite and quartzite south of Chandalar Valley.

s SOLIFLUCTION DEPOSITS--Unsorted, nonstratified to weakly stratified silty rock debris and stony organic silt in sheets and aprons more than 1–2 m thick on lower slopes of valleys. Most common on drift and bedrock south of outer limits of last major (Itkillik) glaciation, but also form smaller, more widely scattered deposits on shale, phyllite, and siltstone (see Brosgé and Reiser, 1964) farther north. Form thin (less than 1–2 m) sheets and aprons over many areas mapped as "drift"

c COLLUVIUM, UNDIFFERENTIATED--Mixed talus rubble and solifluction deposits, as described above, forming aprons more than 1–2 m thick on slopes in southeastern corner of Chandalar quadrangle that lie beyond outer limits of Sagavanirktok River Glaciation. Probably represent multiple episodes of colluvial activity during Sagavanirktok River and Itkillik Glaciations

rg ROCK-GLACIER DEPOSITS--Unsorted, nonstratified, coarse angular rock debris with interstitial ice. Form (1) lobate deposits at bases of talus cones along valley walls and (2) tongue-shaped deposits within cirques (see White, 1976). Subject to slow downslope motion

GLACIAL DEPOSITS

Neoglaciation

nd NEOGLACIAL DRIFT, UNDIFFERENTIATED--Unsorted, nonstratified coarse to fine angular rubble within and near cirques on Poss and Snowden Mountains, at heads of Geroe and Marion Creeks, north Twin Lakes, and between Geroe and Baby Creeks. Designates (1) eroded remnants of Neoglacial drift unassignable to either the Alapah Mountain or the Fan Mountain Glaciation and (2) composite drift bodies too small for subdivision

nd_2 DRIFT OF LATE NEOGLACIAL AGE--Unsorted, nonstratified, coarse to fine angular rubble, possibly ice-cored, forming unstable and unvegetated arcuate end moraine in cirque north of Twin Lakes

nd_1 DRIFT OF INFERRED EARLY NEOGLACIAL AGE--Unsorted, nonstratified, coarse to fine angular rubble, without ice core, forming partly vegetated end moraine and tongue-like lobe that extends 2.5 km from headwall of cirque north of Twin Lakes

Itkillik Glaciation

id ITKILLIK DRIFT, UNDIFFERENTIATED--Poorly sorted nonstratified till, ranging in composition from silty sandy bouldery gravel to clayey stony silt, with local stratified ice-contact deposits consisting of moderately-well sorted sand and gravel. Designates thick (greater than 3 m) drift deposits, usually within mountain valleys, that cannot be assigned to a specific Itkillik moraine system

Subunit *(id)* designates thin (0.5 to 3 m) and generally discontinuous deposits above bedrock within mountain valleys

id_3 DRIFT OF LATE ITKILLIK AGE--Till and stratified ice-contact deposits, as described above. Form sharp-crested arcuate end moraines and very irregular ground moraine in valleys tributary to all major forks of the Chandalar and Koyukuk Rivers. Loess cover generally absent, and exposed clasts very slightly weathered. Also form subdued glaciolacustrine deposits consisting probably of stony clayey silt within Middle and North Forks of Chandalar Valley and Middle Fork of Koyukuk Valley. Formed during stillstands or readvances of glaciers sometime between the 13,000 and 11,000 ^{14}C years BP (Hamilton and Porter, 1975)

id_2 DRIFT OF PHASE II--Till and stratified ice-contact deposits, as described above, with ice-contact deposits more abundant than till in most valleys (Hamilton and Porter, 1975). Form sharply defined drift lobes with prominent knob and kettle morphology south of Big, Twin, and Chandalar Lakes and east of Squaw and Ackerman Lakes. Loess and solifluction cover thin to absent over crests and slopes, and exposed clasts exhibit slight to moderate weathering. Continuous, conspicuously channeled outwash trains extend downvalley from drift lobes, and extensive lacustrine plains extend upvalley. Forms more subdued double moraine system (designated id_{2a} and id_{2b}) along Middle Fork of Chandalar Valley

Subunit *ix* (KAME-TERRACE DEPOSITS) designates very extensive and thick (greater than 30 m) deposits of moderately well to well sorted sand, gravelly sand, and sandy gravel, usually with less than 0.2 m cover of silt, organic silt, and sod, along valleys tributary to Middle and North Forks of Koyukuk Valley

id_1 DRIFT OF PHASE I--Till and stratified ice-contact deposits, as described above, with till predominating in most valleys. Forms broad heavily forested hummocky piedmont lobes with abundant large kettle lakes and extensive outwash terraces at south flank of Brooks Range. Correlation with drift of Itkillik I age in northern Brooks Range is based on steep-sided (up to 18–22°) lateral moraine remnants which occupy mouths of unglaciated tributary valleys in Chandalar region. These are comparable in morphology, soils and weathering characteristics to moraines of Itkillik I age in Philip Smith Mountains quadrangle (see Hamilton and Porter, 1975; Hamilton, 1977)

Subunit *ix* (ESKER AND ESKER-FAN DEPOSITS) designates very extensive and thick (greater than 15 m) deposits of moderately-well sorted sandy gravel containing subrounded stones up to large cobble and very small boulder size. Forms sharp-crested ridge complex that grades southward into fan or fan-delta near north bank of Chekkhechuunjik Creek

to OUTWASH, UNDIFFERENTIATED--Moderately well sorted and stratified sandy gravel, with largest stones decreasing in size from subangular cobbles and small boulders near moraine fronts to subrounded pebbles and cobbles farther downvalley. Forms aprons and valley trains in front of Itkillik moraines, and isolated terrace remnants farther downvalley

to_3 OUTWASH OF LATE ITKILLIK AGE--Sandy gravel, as described above, usually with thin (less than 0.3 m) silt and sod cover. Forms aprons and valley trains in front of late Itkillik moraines. Terraces are up to 15 m high, and generally continuous

to_2 OUTWASH OF PHASE II--Sandy gravel, as described above, usually with thin (less than 0.3 m) silt and sod cover. Forms extensive aprons and valley trains in front of Itkillik II moraines. Terraces generally are continuous and 10–20 m high

to_1 OUTWASH OF PHASE I--Sandy gravel, as described above, usually with thick (up to 4–5 m) and widespread cover of silt and organic silt (loess and solifluction deposits). Forms aprons and valley trains in front of Itkillik I moraines. Terraces generally 20–30 m high and discontinuous

Sagavanirktok River Glaciation

sd DRIFT (Detterman and others, 1958; Williams, 1962, p. 310)--Poorly sorted nonstratified till, probably ranging in composition from silty sandy bouldery gravel to clayey stony silt, with local deposits of moderately well sorted and stratified gravel. Forms broad morainal ridges and hummocky till plains at and beyond south margin of Brooks Range and less extensive drift remnants beyond Itkillik Ice limits near North and Middle Forks of Chandalar Valley. Generally covered by thick (more than 3–5 m), nonstratified to weakly stratified blanket of silt and organic silt (loess and solifluction deposits). Crests of some ridges and knolls yield limited exposures of weathered gravel consisting of subrounded pebbles, cobbles, and small boulders of resistant lithologies from which finer sediments and less resistant rock types have been removed by wind, frost action, and solifluction

Subunit *(sd)* designates thin (less than 3–5 m) and generally discontinuous drift deposits on bedrock between Sagavanirktok River and Itkillik Ice limits

so OUTWASH--Moderately well sorted, stratified sandy gravel, with largest stones probably decreasing in size from subangular cobbles and small boulders near moraine fronts to subrounded pebbles and cobbles farther downvalley. Associated with the maximum limits of the Sagavanirktok River drift in Chandalar Valley between Function Creek and East Fork of Chandalar River. Form terraces 40–50 m high

Anaktuvuk River (?) Glaciation

ad DRIFT (Detterman and others, 1958; Williams, 1962, p. 310; Hamilton and Porter, 1975)--Glacial deposits of unknown composition forming very subdued ground moraine beyond limits of Sagavanirktok River drift in valley of Fâhchîton Creek. Covered by thick and extensive solifluction deposits

Subunit *(ad)* designates scattered erratic boulders and thin, very discontinuous patches of weathered till on bedrock beyond limits of Sagavanirktok River drift south of Chandalar River

ao OUTWASH--Strongly weathered, moderately well sorted sandy cobble gravel forming eroded terrace remnants associated with limits of Inferred Anaktuvuk River ice south of Chandalar River

(pd) PRE-ITKILLIK DRIFT, UNDIFFERENTIATED--Isolated subangular to subrounded cobbles and boulders, thin (less than 2 m) patches of poorly sorted pebble-to-boulder gravel, and thin (less than 3 m) patches of drift of unknown composition overlying bedrock south of Chandalar River. Lie within probable limits of Anaktuvuk River Glaciation, but have been overlapped to unknown extent by ice advance of Sagavanirktok River age

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GEOLOGIC SYMBOLS

- Bedrock
- Surface and subsurface lacustrine deposits
- Morainal ridge
- Contact - Dashed where approximately located or inferred
- Pingo
- Spring
- Prominent kame or kame complex
- Direction of glacier flow across topographic divide - Queried where uncertain

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